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OPTIMIZATION-BASED DESIGN OF CONTROL SYSTEMS (US)  
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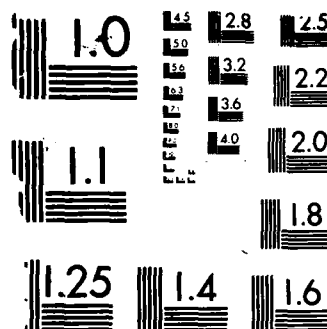
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## REPORT DOCUMENTATION PAGE

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1a. REPORT SECURITY CLASSIFICATION Unclassified			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION/AVAILABILITY OF REPORT Unlimited		
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE					
4. PERFORMING ORGANIZATION REPORT NUMBER(S)			5. MONITORING ORGANIZATION REPORT NUMBER(S) <b>AFOSR-TR-87-0860</b>		
6a. NAME OF PERFORMING ORGANIZATION Electronics Research Lab.		6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION Air Force Office of Scientific Research		
6c. ADDRESS (City, State, and ZIP Code) University of California Berkeley, CA 94720			7b. ADDRESS (City, State, and ZIP Code) Bldg. 410, Bolling Air Force Base Washington, DC 20332		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION AFOSR		8b. OFFICE SYMBOL (If applicable) nm	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER AFOSR 84-0250		
8c. ADDRESS (City, State, and ZIP Code) Same as 7b			10. SOURCE OF FUNDING NUMBERS		
			PROGRAM ELEMENT NO. 61102F	PROJECT NO. 2304	TASK NO. A1
			WORK UNIT ACCESSION NO.		
11. TITLE (Include Security Classification) Optimization-Based Design of Control Systems					
12. PERSONAL AUTHOR(S) E. Polak					
13a. TYPE OF REPORT Final Report		13b. TIME COVERED FROM 7/1/84 TO 12/31/86		14. DATE OF REPORT (Year, Month, Day) 2/26/87	
15. PAGE COUNT 4					
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP			
19. ABSTRACT (Continue on reverse if necessary and identify by block number) (i) A VAX 11/780 system has been expanded so as to facilitate the implementation of DELIGHT.MIMO, an interactive software system for the solution of optimal, worst case design of multivariable control systems. (ii) A SUN workstation - based system has been assembled for experiments in distributed computing for the optimal, integrated design of flexible structures and their control systems.					
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION		
22a. NAME OF RESPONSIBLE INDIVIDUAL James M Crowley maj			22b. TELEPHONE (Include Area Code) 22c. OFFICE SYMBOL		

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**AFOSR-TR- 87 - 0860**

**OPTIMIZATION-BASED DESIGN OF CONTROL SYSTEMS**

**Final Technical Report**  
AFOSR Grant 84-0250  
(July 1, 1984 - December 31, 1986)

**Elijah Polak**  
Principal Investigator



Accession For	
NTIS CRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
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### **Abstract**

(i) A VAX 11/780 system has been expanded so as to facilitate the implementation of DELIGHT.MIMO, an interactive software system for the solution of optimal, worst case design of multivariable control systems. (ii) A SUN workstation - based system has been assembled for experiments in distributed computing for the optimal, integrated design of flexible structures and their control systems.

### **Introduction**

As part of our research on optimization-based design of multivariable control systems (sponsored by ONR) and on the optimization-based, integrated design of large space structures and their control systems (sponsored by AFOSR), we are carrying out research on the development of interactive software systems for the implementation of the design techniques we are producing. In particular, (i) we are developing DELIGHT.MIMO, an interactive computing system for the optimal, worst case design of multivariable control systems, and (ii) we are beginning to architect a distributed computing system, consisting of a work station for user-machine interaction and a large frame computer for system response simulation, for the design of flexible structures and their control systems.

### **Summary of Equipment Use**

- (i) The expansion of our VAX 11/780 system and associated graphical terminals has consisted of the addition of the following items:

1. MS780EC memory controller with 2Mb memory
2. 6Mb National Semiconductor memory
3. TU58-AB tape drive with formatter
4. 10 Mb 3com ether connection
5. Tektronix 4115B color terminal
6. 2 Fujitsu Eagle disk drives

As a result of these additions, system response has increased considerably and the DELIGHT.MIMO system will be usable in medium size design experiments. Furthermore, we were able to implement a much more sophisticated color graphical interaction capability than the one we had before that.

- (ii) The distributed computing, optimal design system is now beginning to be implemented. The workstation system consists of the following items which, due to changes in the manufacturers' lines, took an unexpectedly long time to assemble:

1. Sun-2/170 (rackmountable SunStation)  
MC68010 CPU and 2-RS232 serial lines  
Two 1.0 Mbyte memory boards  
Ethernet Interface  
15 - slot IEEE-796 multibus card cage
2. 4.2 Unix software distribution
3. Two main memory expansions
4. Floating Point Processor
5. Monitor, keyboard, and mouse
6. SunColor Graphics  
19-inch RS-170 color monitor
7. 1/4 inch tape cartridge tape subsystem
8. File Server (a stripped SUN 120)
9. 384Mb formatted disk system
10. Ethernet accessories
11. Additional SUN 3/50 Workstation

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